STEELWAYS

November 1961

How to build a better home (page 1)

The facts behind steel's employment figures (page 8)

Steelways®

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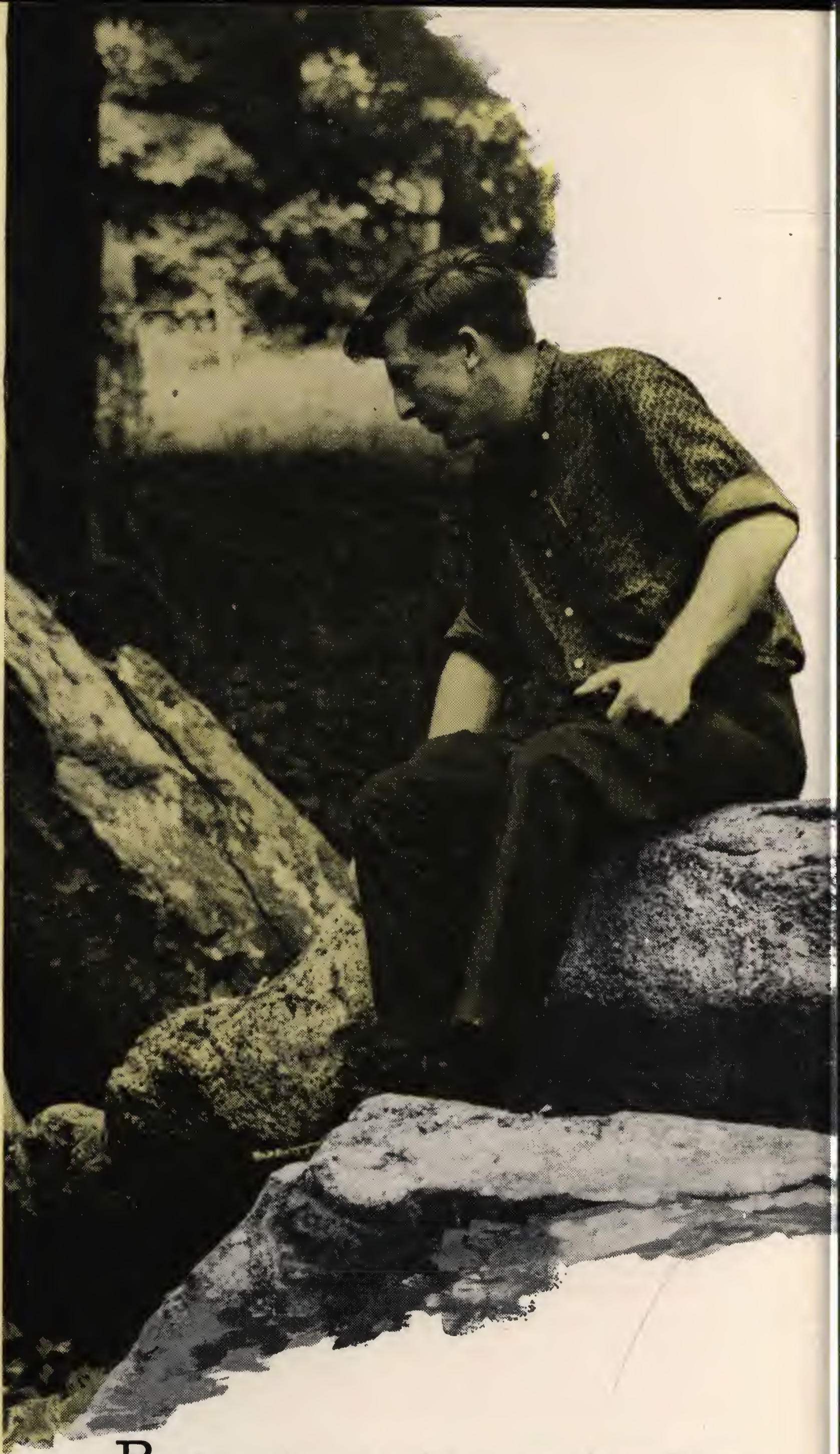
STEELWAYS is published five times a year by American Iron and Steel Institute and distributed for the purpose of widening public understanding of the iron and steel industry.



People, you know, benefit from permanence. There's bound to be enrichment in living in a *true* family home—one that successive generations can comfortably live in. How many times have you felt the wealth of tradition present in some old, mellowed structure? That's what a home can give—if it lasts long enough. To last it must be made of durable materials, and steel is certainly that.

What I'm trying to convey is perhaps best described by the reaction of many of my clients when they first see the steel frame for their home standing on the lot: they're thrilled with the real mark they've made on this earth. How often I've seen them walk around and touch the framing members with a kind of quiet reverence.

But there is much more to it than a person's desire

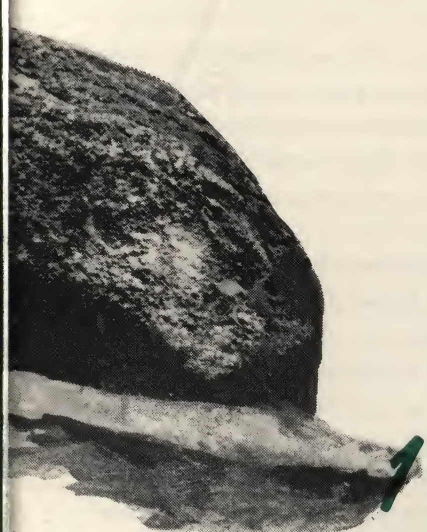
Since his graduation in 1950 from the School of Architecture at the University of California, David Thorne has put into practice the residential design concepts that earned him the classroom sobriquet of "the steel renegade."

In his efforts "to create a more beautiful and better constructed residence" he has found that "steel holds the greatest immediate promise for both designer and homeowner."

Steelways caught up with him on site in Connecticut (at left), where he listed six major advantages of steel frame residences and explained why he believes that steel is bound to have a growing role in American residential architecture.

By David Thorne as told to A. Holmes Fetherolf, senior editor

STEEL is his frame of reference



1 Permanence

for permanence. As a society, we have no more land to waste on temporary and impermanent buildings. Residential areas made of such materials can't hope to last beyond one to one-and-a-half generations. Then what happens?

Well, just look at the number of cities concerned over this matter. I think immediately of an area near me: Berkeley, Calif. Once a beautiful residential area, it is now suffering from what I call apartment house creep. The fine homes built two to three decades ago from nondurable materials have deteriorated through fungus and parasites to the point where remodeling is uneconomic. Bought by speculators, they are destroyed and the speculator then holds what amounts to a piece of high priced real estate. To make this pay off, he crams as many "ding-bat" efficiency apartments onto the lot as possible, creating a ready-made slum for the 1970's.

Had the original homes been constructed in durable materials, like steel, they could today be economically remodeled and the character of a residential city would have been preserved.

Everywhere, these days, you hear talk of town planning and design. But you cannot permanently plan for a town if you don't build with permanent materials. That's what the Berkeley example proves.

Now I know somebody will fire right back that all this is well and good but that steel framing is expensive. But is it really? If a building lasts and lasts and lasts without incurring high maintenance costs, then how can you speak of it as expensive? I mean, every year it goes on the yearly cost of it is reduced—year by

year the house gets cheaper. It's the old story: the best is, in the end, the cheapest because it lasts the longest.

Which is not to say original cost isn't perhaps relatively more expensive—though let me say here and now I never used steel if it was not the most economical way to get the sort of home and design my client wanted. But it has turned out to be the most economical way to get those things.

In the meantime I think we're proving, in this private, custom residential work, that in the end steel is the only material flexible enough in planning and erection, cheap enough in fabrication yet permanent enough to make modern mass housing possible on a real quality basis. And I mean prefabricated housing! As we go along, you'll begin to see what I mean.

And remember this, too: the more we architects use this material and get wise in the ways of it, the more we will succeed in lowering our costs. It's just like a TV set—remember how expensive they were in the beginning? And now, just look! Some day I'm convinced it will be the same with steel framed homes. Now let's see why...

2 Building ease and precision

Here's a picture of the end of a cantilevered bedroom wing in a steel framed home. I think I can make my second point here.

You see those lower, main carrier beams coming out toward you from that masonry wall? Well, they were all fabricated with brackets welded onto them in precise position to receive the cross beams.

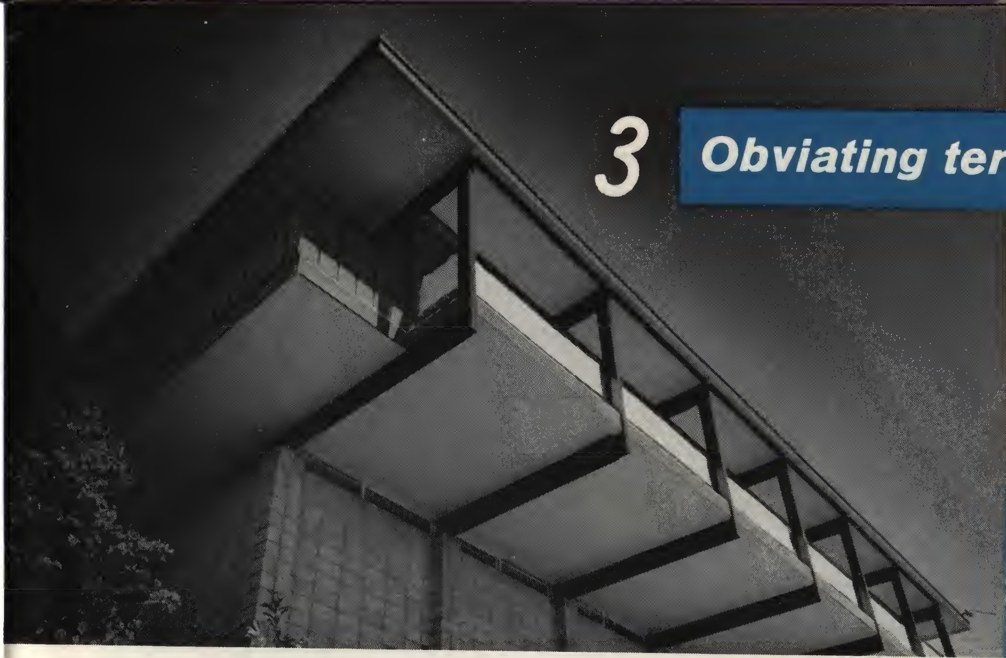
This job was done in a steel fabricator's shop to tolerances of an eighth of an inch. Delivered to the site, we just dropped our other beams on and welded them up. Easy and quick.

Now, using steel we were able to design and fabricate the frame of this house to give us a series of 8-foot modules to work with. I mean that the horizontal and vertical dimensions of the house broke evenly with a divider of eight. That meant we could promptly install factory-made module materials like 8-foot sheets of wall paneling, glass and so on. All this stuff comes all set in 4-by-8-foot sections—every do-it-yourselfer knows that. Since we could install it as delivered, we saved all kinds of carpentering and other expenses on the job.

But to get this kind of saving you need precision in your framing. With conventional materials you'll find brand new homes out of square by as much as 1½ to 2 full inches! But not with steel. Square *is* square in steel. But you just can't get anywhere near that close with other materials. And that means, in turn, all kinds of nasty and expensive carpenter jiggling on interior finishes...

And that cantilevered beam supporting the carport was a neat trick, too. Had we put a column out there to support the corner of the carport we'd have run afoul of setback provisions in local building codes. We couldn't have made the port big enough for two cars. By putting the cantilevered beam in we obviated the need for a column. The deck overhead is classed as a roof which it's permissible to bring near enough to the property line to make a shelter for two cars.

You see, there's a lot of angles to this business.



3 Obviating terrain and soil difficulties

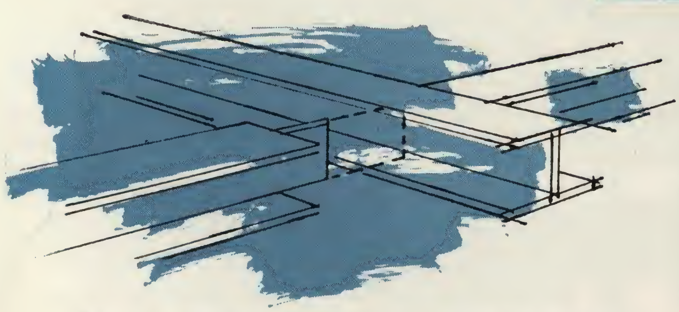
Now we get into exciting stuff. Take this house. That floor up there is more than 30 feet above grade! We call this a "junk lot." It dropped off so steeply you just couldn't put a house on it using conventional materials. But remember, in steel you've got a material 10 times as strong and 20 times as stiff as wood.

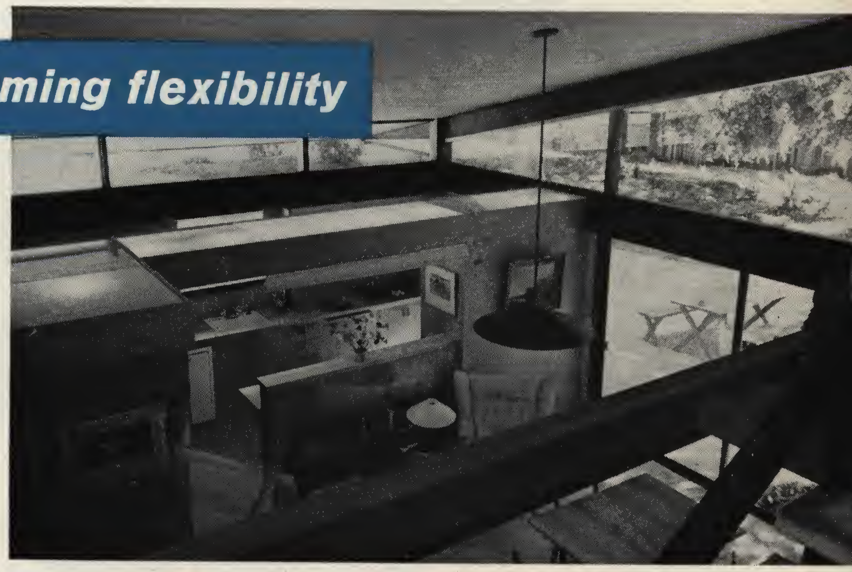
So, we just cantilevered the entire living area of the house right into space on steel beams. And that's the point: with steel you can flatten and use an otherwise bad lot by just moving into air.

This frees design even on flat lots. You can set a house *on* the lot, up *in* the trees, rather than plowing a hole into the ground to bury the house in.

Soil problems may occur no matter what the lay of the lot is. Suppose poor soil necessitates piering up a house. It makes much more sense to concentrate ten yards of reinforced concrete in a fewer number of piers than to smear 100 yards of the stuff all over the lot in conventional pier foundations. You can get that concentration with steel framing because it can span the greater distances between the piers. You're left with a truly engineered and lasting foundation and frame.

4 Framing flexibility





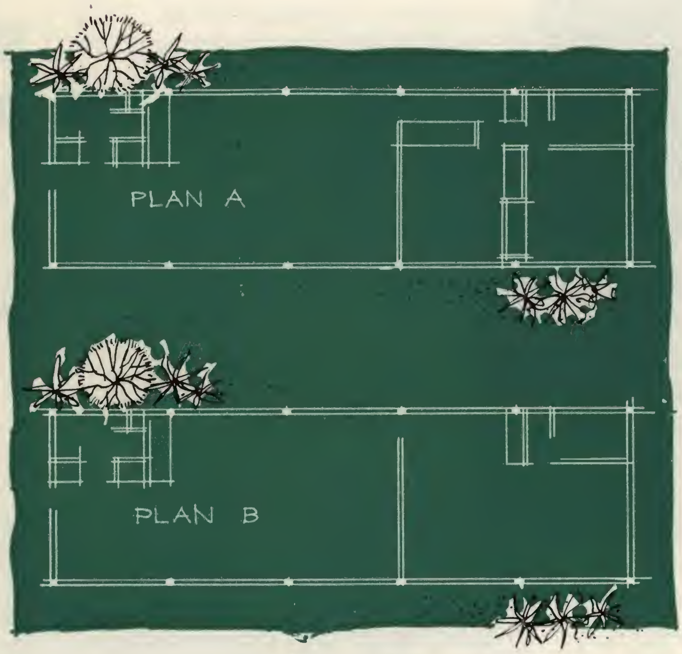
This is kind of tough, but the point I'm trying to make here is how easy it is to expand a house framed in steel.

Take this picture. You can see that the area we're looking at is all framed in steel. What's inside the area, such as the kitchen "walls," isn't performing any structural function at all. It isn't holding anything up, I mean.

So, we can take everything out of there and just add right onto those steel girders you see crossing the room lengthwise. All we have to do is weld the new beams onto these to make each a longer, continuous beam. Then we just go ahead and design the interior for the expanded area.

It may not seem like much, but just consider the problem of connecting beams—especially in a horizontal extension — in other materials, like wood. It's darn tricky. But in steel it's just a standard welding connection; nothing new or fancy about it. That's what I call framing flexibility.

5 Living plasticity



This concept is related to the point we just left, framing flexibility. It means you're building a residence that can give and take, change its character, as it were, along with the people who live inside it.

That ability revolves around not only the long lasting strength of steel but on the fact that interior walls are, in effect, "free standing." They aren't set for all time due to the structural duty they perform. They don't perform such duty. The steel frame carries the whole load.

That means you can juggle the inside around just as you wish. You have permanence but not stagnancy.

For example, what you see here is the floor plan for a steel-framed mountain cabin retreat. Now only the steel beams and columns marked are supporting the structure. So, the present owner, or maybe the children he leaves the house to, can completely change the interior along lines suggested in this other drawing. No strain.

While we're at it, take a look at the chandelier shown in the interior view of the cabin. It's cantilevered 7 feet out from the beam on a curved steel arm. That means it can swing through a 14-foot arc to give lighting versatility.

Tacking the arm onto the beam was a cinch. Similarly, that fireplace screen you see in the right of the picture is just hung on steel members we welded to that other ceiling beam in the background. Welding, you see, makes a simple, sure connection.

6 Strength to spare

This picture of a steel frame for a house is interesting for a couple of reasons.

First, it's worth noting that the seven rectangular sections of framing were delivered to the site all prefabricated and simply set up with a crane. That was it.

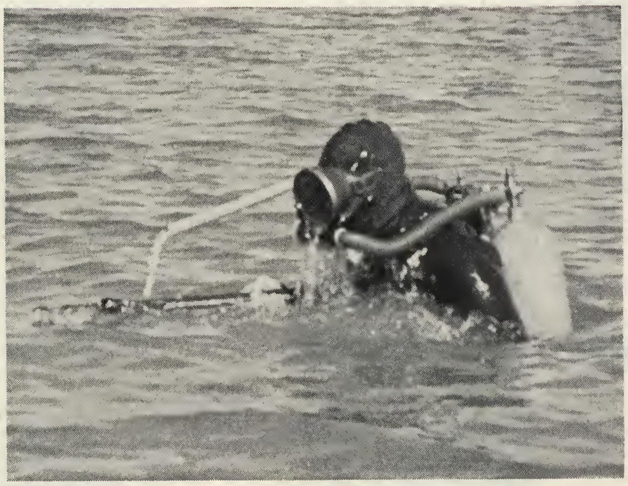
But the real reason I'm showing you this is to illustrate the marvelous strength of steel. You see that vertical column in there that I've marked? Well, the owner just took it out—and nothing happened at all! The roof beam didn't even sag.

Now this was a supporting steel column and no one is saying that it should have been taken out. The point is that it was, and the additional load was absorbed by the other members of the frame without any deflection.

Not only is the material strong to start with, but you design so that lots of that strength is left in reserve. That gives you ample protection against natural catastrophes or perhaps just sheer human fallibility.

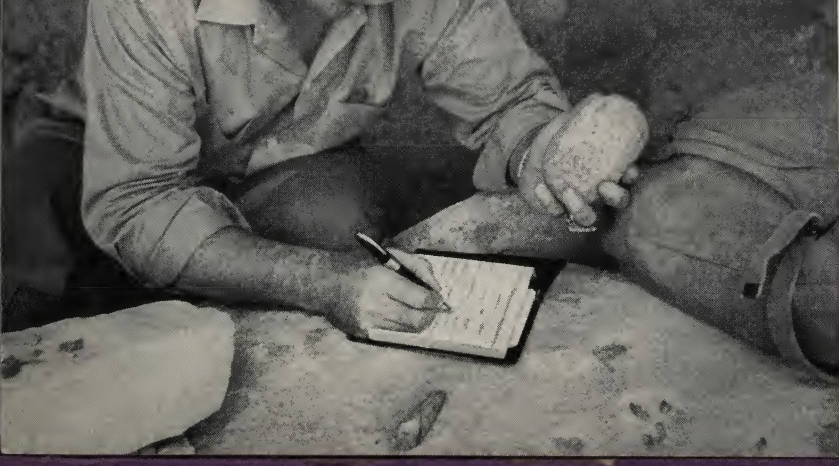
I'd like to see what would have happened if you took a supporting column like that out of a house built with conventional materials!

You know, for some time I've been professionally insistent that any honest appraisal of the characteristics of all available structural materials will illustrate the tremendous value of steel in residential architecture. Now you can see why.



What a man does is not what a man is. But his use of the means and leisure he earns through work may reveal that secret. Meet a steel mill electrician's helper (left) also skin diver (above) and archeologist (right and below)

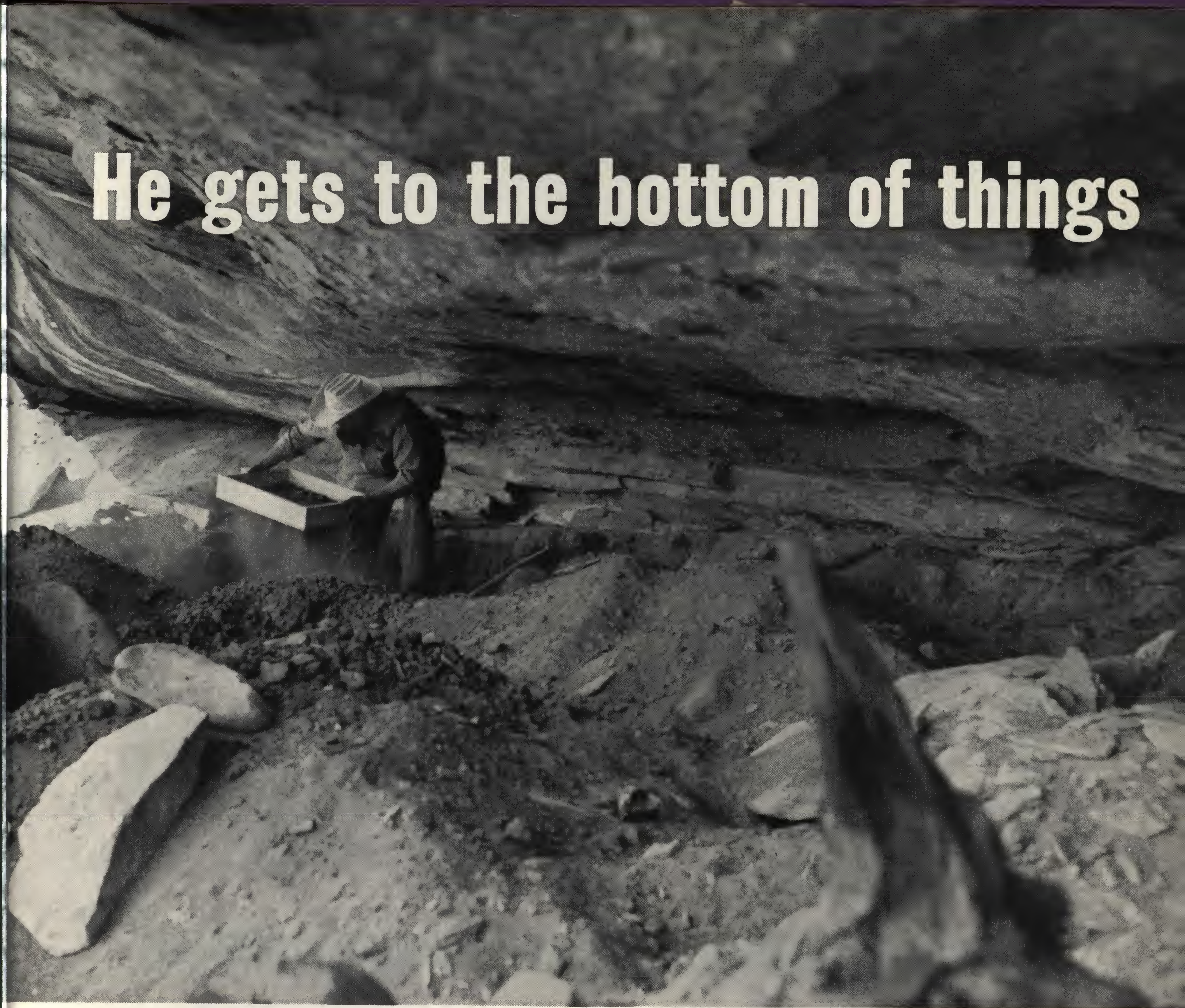
No. 2 Leisure into Living



HE LOOKS like a loner and his private pursuits do take him into some remote spots under both earth and water. In the Western steel mill where he works, however, Allen Van Auken is surrounded by about 1,000 personal aides. They lighten his work and lengthen his leisure. They also happen to be invisible, but in a very material way they account for his having both the energy and the time to dig and dive.

Van Auken is an electrician's helper in the plant's electrical maintenance department. And his aides are actually his individual share of the 30.3 billion kilowatt hours the steel industry used in 1960 (sufficient to supply 8 million American homes).

Those kilowatt hours are the energy equivalent of about 452 million men, which shared by the industry's



He gets to the bottom of things

462 thousand real life workers gives each a sizable company of unseen assistants.

Few may think of these things, but it is such technological intensity as this that has made it possible for Van Auken to realize, *through* his work, a living and a leisure with which to expand the horizons of his own character.

THAT character expresses itself in a rare collection of sea shells, and another of at least 10,000 items of Indian life ranging from statues to skulls. It is expressed, too, in his duties as president of his local archeological-historical society and as vice president of his state's archeological society.

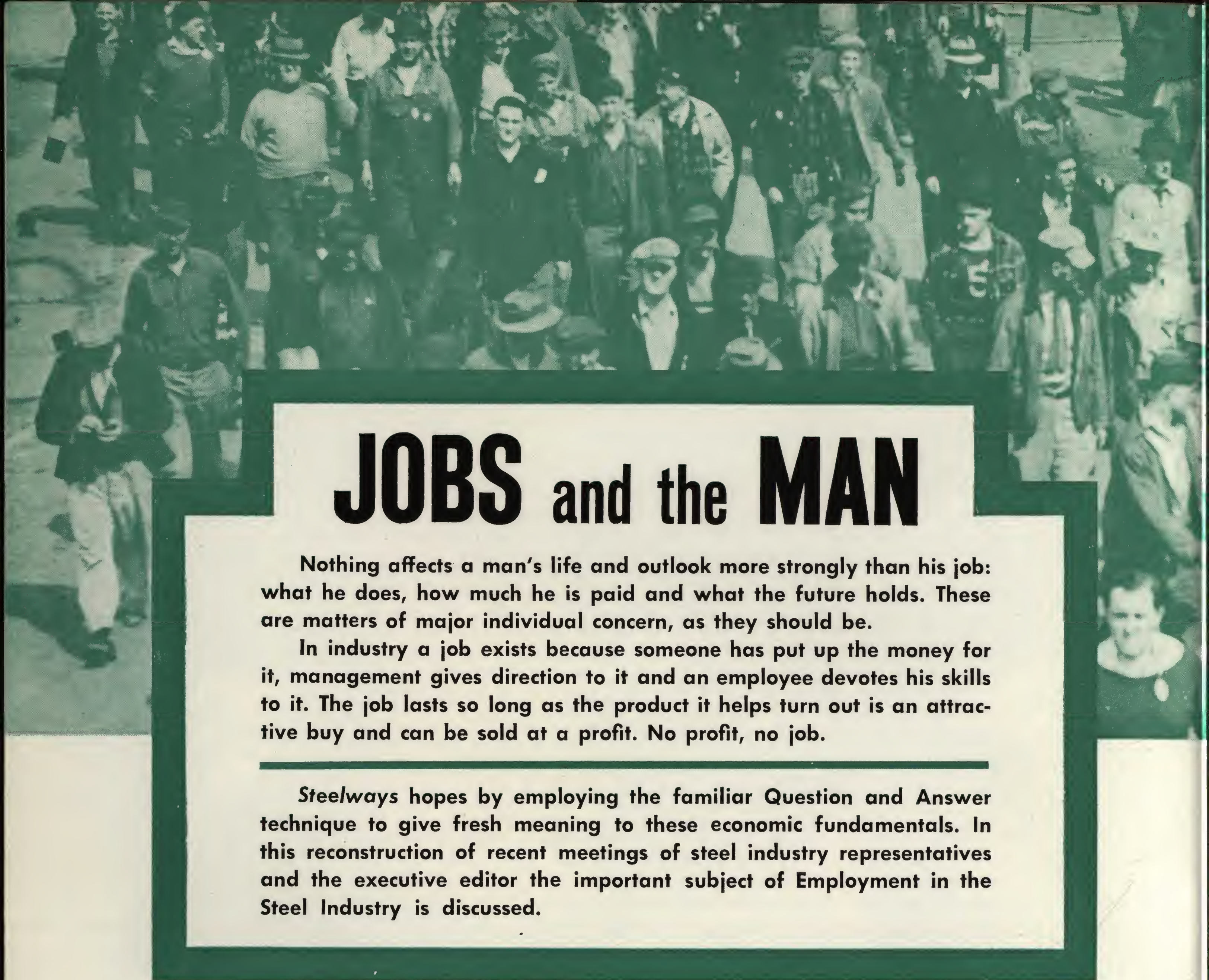
In his extensive travels for these organizations he is a kind of roving lifeguard, available to state policemen in any case of emergency underwater rescue operations.

A card in his car's rear window proclaims this availability, and it's backed up by a trunk crammed with both deep sea and skin diving gear. He serves without recompense.

Van Auken sees his life as a blend of work and what that work has made possible for him.

He does not see his "work" as a separate and necessary thing to be done but as the major part of, and contributor to, his pattern of living. Ask him.

When we did, he responded: "At last I have found the kind of work I like and I couldn't have found a finer bunch of people to be associated with." That says it all. He really does get to the bottom of things.



JOBS and the MAN

Nothing affects a man's life and outlook more strongly than his job: what he does, how much he is paid and what the future holds. These are matters of major individual concern, as they should be.

In industry a job exists because someone has put up the money for it, management gives direction to it and an employee devotes his skills to it. The job lasts so long as the product it helps turn out is an attractive buy and can be sold at a profit. No profit, no job.

***Steelways* hopes by employing the familiar Question and Answer technique to give fresh meaning to these economic fundamentals. In this reconstruction of recent meetings of steel industry representatives and the executive editor the important subject of Employment in the Steel Industry is discussed.**

Q. Gentlemen, suppose we start off with a basic question: what is the employment picture in the steel industry?

A. Here are the latest annual figures. Bear in mind that these figures include only those engaged in the production and sale of steel and exclude many additional thousands of people whom our industry employs in supporting activities ranging from our mine fields to steel construction workers.

In 1960 the companies that make up our industry employed 601,600 persons in the production and sale of steel. In 1946, by comparison, we had 575,300. In 14 years the industry's total employment of such persons has risen nearly 5 percent. And this increase works out to be even greater—10 percent to be exact—if you go back to 1940 for a base year.

Q. Now that's the total, but what about employment among wage earners; that is, the hourly paid employees?

A. In 1960 we averaged 461,900 wage earners on our payrolls; in 1946 when the industry was operating at a somewhat higher percentage of capacity there were 490,000. This was a decrease of less than 6 percent. And if the operating rate had remained as high as it was during the first six months of 1960, there would have been an increase in hourly employment.

Q. This reduction that you speak of in hourly employees is probably smaller than many people realize. A report of a Congressional committee read into the *Congressional Record* earlier in the year, for instance, stated that in steel "250,000 workers today are doing the work of 500,000 of 12 years ago."* Your figures appear to be at very considerable variance with these.

*Extension of remarks of Hon. Elmer J. Holland (Penna.), April 11, 1961.

A. If 250,000 people in 1960 had done the work of 500,000 people in 1947, we would have required only a few more than 300,000 employees in 1960. Actually, we employed double that—over 600,000. The facts show that the number of people employed by our industry has remained relatively constant for periods of comparable business conditions.

Q. But there is a decrease in the wage earner ranks, however small. Can it be called a trend?

A. No. While there are short term, cyclical changes in employment, the fact is that at any given rate of operations the companies in the steel industry employ about as many wage earners as they ever have.

The one certain trend in employment has to do with salaried employees: a higher and higher percentage of these are on the overall payroll. This is true, we might add, of almost any American industry.

Q. Why is it true specifically of steel?

A. Because we face a greatly augmented competitive assault. To the competition among ourselves that we've long experienced and that largely accounts for the diversity of product lines among the companies that make up this industry, we must now add the intensified competition from other metals and materials whose technology has brought them onto the mass market only relatively recently. Producers of such materials are under great pressure to find the mass markets that alone will warrant their production apparatus. Nor are they the only ones we now must aggressively meet in the market—there's also imported steel.

We are competing, in other words, with each other, with other metals and materials and with overseas producers of our own metal. To reduce costs while improving quality and maintaining the profits which alone can replenish our strength in this continuing competitive battle, we need more research specialists, more engineers and more specifically trained men for operating and financial analysis.

Q. In general what are these men doing?

A. As we've said, we simply must constantly make our products more attractive, and at accelerated rates of change, if we are to keep our older markets and win new ones. Now, attractiveness takes many forms; it could be price or quality or service or any combination of these and other factors. To achieve these objectives technological change is imperative. Obviously, too, we are not going to succeed unless we can get our present day costs down. So, many of these newcomers to the business will assist in product and method improvement and cost and quality control. They will contribute, in a word, to our giving greater and greater *value* for every user dollar spent on steel.

Q. And you need more people to sell the steel, too, don't you?

A. Very definitely. Steel companies are expanding their selling and marketing staffs, adding men who are familiar with new selling approaches and who can help their customers utilize steel more effectively.

Q. But these are salaried employees. What about the prospects for the hourly paid workers?

A. To better gage the prospects we should first examine the steel industry's record of separations, as they're called. The rate of separations is comparatively low—lower than for manufacturing generally.

Q. Well, then, there aren't many opportunities arising from separations?

A. On the contrary. Though the steel industry has a low rate their number tends to moderate significantly the necessity for lay offs or other forms of involuntary unemployment in adverse business conditions.

Q. Can you give me this in figures?

A. Surely. Total employment in steel declined by only 26,100 between 1953 and 1957. During the years 1954, 1955 and 1956 approximately 239,000 individuals left their jobs in the industry for reasons other than lay off. Thus, turnover provides opportunities for employment in the steel industry.

Q. You are speaking of total employment, though, aren't you; not just production workers?

A. Yes. that's true, but approximately 80 percent of all steel employees are production and related workers.

Q. But what about the separations caused by automation? One union leader appearing before an investigative body in Washington last March singled out steel as "one example of what happens when rapid technological developments are instituted with little regard for the plight of the workers who will thereby be replaced."*

A. Actually, there has been very little automation in the steel industry. We have had technological change, but that is not the major cause of unemployment in the steel industry. Such increases in output per manhour as it has afforded have been so gradual that few employees have been displaced for this reason.

When unemployment occurs in the mills, it is due almost entirely to a lack of orders for steel products, resulting from a combination of competitive factors at home and abroad, strike influences, inventory accumulations and liquidations, and the general economic situation of the country.

*Joseph A. Beirne to the Congressional Subcommittee, March 20, 1961.

LACK OF ORDERS IS THE MAJOR CAUSE OF UNEMPLOYMENT

Q. Then the steel industry reacts the way most industries do to changes in the business climate?

A. Yes, when business is bad, employment goes down. When business is good, employment goes up. Let us give you an indication of the impact of levels of business on employment in steel. From January to June 1961 the steel companies increased their employment by over 50,000 employees as demand for steel rose—and these were practically all hourly paid employees. But even with steel's low turnover rate, the steel companies had to add over a *hundred thousand* employees during that period in order to wind up with 50,000 more employees in June than in January.

Q. Well, if automation is not reducing employment, then maybe I'm not using the right word. I'm thinking of the technological advances that are constantly being made within the steel industry. Things like oxygen in open hearth furnaces, bright annealing, new thin tin, vacuum melting and casting, modernized sintering processes—just to name a few that have come into their own in recent years. What about those?

A. They're the kinds of things that give this country a high and rising standard of living. One of the by-products of advancing technology is the *changing composition of jobs*. But that type of change does not necessarily or even usually mean a *reduction* in employment.

Q. Will you please amplify that a little?

A. Advancing technology has meant shipments of more and better finished steel rather than unemployment, barring, of course, the short term swings of business generally. Equally important, it has also meant better jobs. That's what we mean by the term "changing composition of jobs."

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COVER—TABER CHADWICK. INSIDE FRONT COVER, 1, 2, AND BOTTOM 3—DAVID THORNE; TOP 3—PHIL FEIN. 4—ERNEST BRAUN. 5—FRED ENGLISH. 10, 11 (GRAPHICS) BILL DOVE. 12, 13 (GRAPHICS)—KERR STUDIOS. 14, 15—F.P.G. 16, 17 (CHART)—J. G. SUSSILLEAUX. 21—KEPLER STUDIO. 24—THE BETTMANN ARCHIVE, INC. INSIDE BACK COVER—THOMAS SGOUROS. BACK COVER—DAVID THORNE.

Q. But doesn't change sometimes bring displacement.

A. Yes, there is some relationship there, and we certainly are not saying that technological advancements do not cause some displacements. We are simply saying displacements of this nature are not a major cause of unemployment.

Q. But major or not, they create a problem, don't they?

A. Yes, even the hint of change. Change is a source of concern to a worker who believes he may lose his job entirely or may be moved to a lower-paying job as a result of the change.

Q. In other words it depends on the extent to which the individual himself is affected?

A. Not necessarily. The mere report that a change is to be made may arouse concern about jobs. We are sympathetic to it and insofar as possible we cushion men against change.

Displacements due to AUTOMATION are NOT A MAJOR CAUSE OF UNEMPLOYMENT

Q. Well, your statements certainly differ from one I came across recently. That was part of some Washington testimony too and said: "In the main management policies have been nonexistent or a tacit willingness to let those displaced by employment go to the industrial scrap heap."*

A. We would have to say that those are pretty extreme words. As we have sought to point out, technological displacements are not predominant. They do not recur on any regular basis. We wish they wouldn't happen at all—but there are times when a man must face the prospect of finding a new job or upgrading his skills to win a new place within his company or another company because his present job isn't there any more.

Q. Are all such changes the result of technological advancements?

A. No, and this is an important point to stress, we think. Changes like this are sometimes caused by other factors. For example: when foreign steel producers took

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*James B. Carey before the same Subcommittee, March 22, 1961.

STEEL COMPANIES TRY TO CUSHION THE IMPACT OF TECHNOLOGICAL CHANGE ON WORKERS

over most of this country's barbed wire business, some American steelworkers lost their jobs, although the loss had nothing to do with technological change.

Q. But when there is technological change—what is done for the employees affected by it?

A. In answer to that, we should like to describe a procedure that one company follows. We think it's representative. First, the company makes an analysis of the number of employees affected. Their service, age, family status, place of residence, seniority status and ability to perform other work in the plant are also ascertained. Their pension status, severance and unemployment compensation benefits are determined.

Q. You will try to absorb the employees elsewhere in the mill if you can. Is that true?

A. It certainly is.

Q. Have you been successful there?

A. Well, here is a case in point which you can judge for yourself. Competitive considerations forced a steel company to shut down a big mill and replace it with a new and much more modern one. There were 1,346 employees involved. A later survey showed that 953 of them, about 71 percent, had been retrained and were working in the new mill. Another 109, about 8 percent, were transferred to work in other operating departments of the plant. Of the remainder only one was on lay off, and 29 were on sick leave. The other 254 were accounted for by retirement, voluntary termination, discharge for violation of plant rules, death and leave of absence. We don't always do as well as this, but we try hard to make our showing just as good as possible.

Q. Well, now that we've talked about numbers of men at work, can we turn to the question of how constantly they work?

A. Yes—by comparing steel with another major industry employing hundreds of thousands—automobiles. In the automobile industry temporary high levels of production are commonly met by working overtime—six days per week rather than five, a practice reversed when production falls. In steel, however, increases in production are usually accomplished mainly by increasing the number of units in operation, with the work week generally remaining at the standard 40 hours.

Q. Well, I don't quite see—

A. Look at it this way. A 20 percent increase in the number of automobiles assembled is likely to mean an increase in weekly hours from 40 to 48. In steelmaking a similar increase in production ordinarily means a roughly proportionate increase in the number of open hearth furnaces operating or the addition of a crew on a rolling mill.

Q. You mean there is less fluctuation in a man's pay envelope, then, don't you?

A. Yes. Our variation in average hours paid for per week has been remarkably small. In steel the range for the years 1947 through 1960 is from a low of 37.5 in 1958 to a high of 40.9 in 1951. If the recession years 1949, 1954, 1958 and 1960 are excluded, the range is from 39 to 40.9.

Q. By comparison, what is it for automobile manufacturing?

A. For the same period it's somewhat greater—from a low of 38.4 in 1948 to a high of 42.7 in 1955—a spread of 4.3 hours per week.

Q. Then the point you are making is—

A. That with minor exceptions of recession periods, the 40-hour week has been the prevailing pattern in the steel industry.

Q. Gentlemen, we've covered a lot of ground here. I wonder if you will sum up for us?

A. Yes—

WE'VE TRIED TO MAKE 5 MAIN POINTS

1. Technological change is vital to the continued good health of the steel industry and its ability to preserve and increase jobs.
2. Employment in steel over the years has been remarkably steady in terms of both numbers of people employed and continuity of work and pay for regular employees.
3. In the long run the ability of steel companies to increase employment depends on their ability to expand sales, which in turn requires an improvement in their competitive position.
4. Turnover in the steel industry, while lower than that for most industries, provides a substantial number of job openings each year.
5. Except in periods of sharply declining business activity, employees in the steel industry work full time throughout the year.

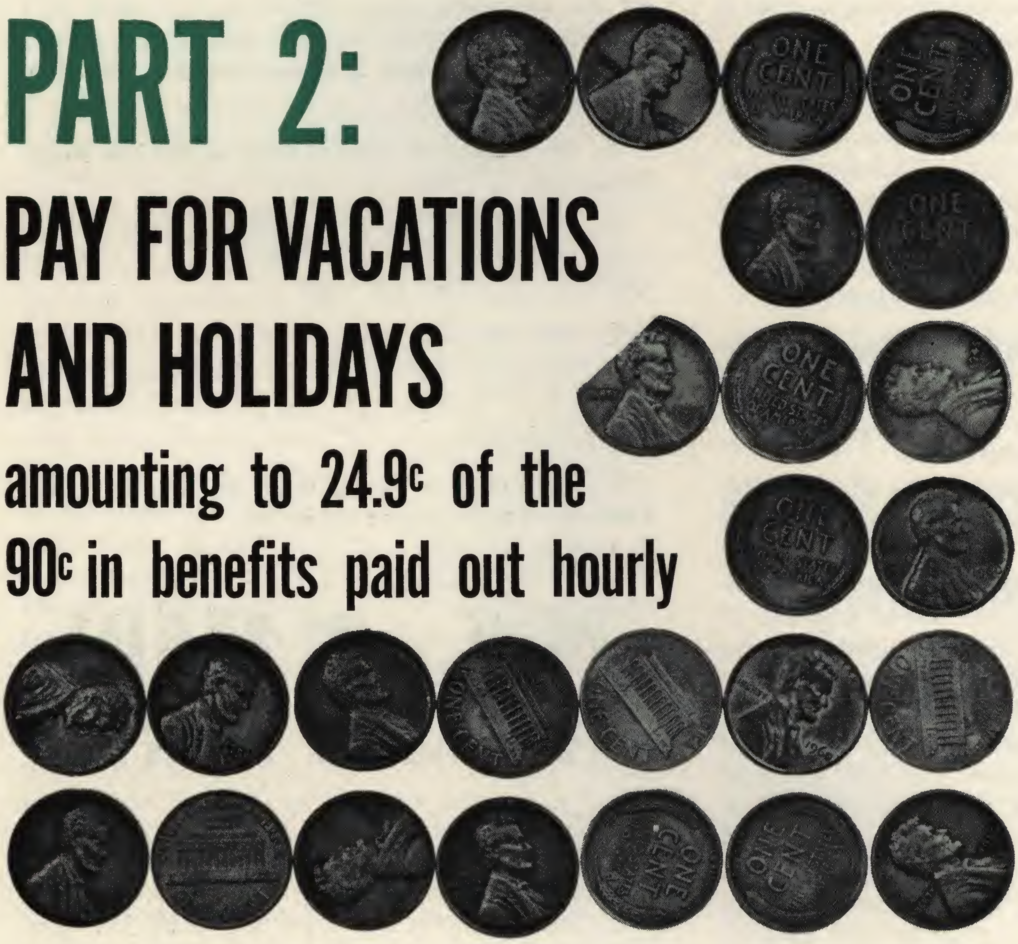
$759,000,000 IN 'FRINGE' PAY

More than three quarters of a billion dollars, it constituted 24% of the steel industry's total hourly employment cost last year *

PART 2:

PAY FOR VACATIONS AND HOLIDAYS

amounting to 24.9¢ of the 90¢ in benefits paid out hourly



THE steel industry observes seven holidays each year. When Marty, or any other eligible steel employee, does *not* work on one of these holidays he nonetheless receives for that day his regular hourly rate of pay, exclusive of premium pay, for the job to which he is regularly assigned.

And if Marty is one of a majority of steel industry employees who work under incentive plans (depending on production), his holiday pay is based on his average hourly earnings which include his incentive earnings.

This premium for holidays *not worked* yields Marty a sum which, when averaged into all the hours he works in a year, adds nearly 5½ cents to his hourly pay. The aggregate cost of this benefit provision to the industry in 1960 was $46 million.

There is but one limitation on this premium in most companies: the employee does not receive this stay-at-home holiday pay if he is scheduled to work on that

NEXT: PART 3 — SECURITY BENEFITS

IN 1960 **Marty Stokes, a wholly fictional but statistically average steelworker, averaged $2.92 an hour in regular straight time hourly wages. Yet in the end his company had to provide $3.82 for each hour he worked. The added 90 cents an hour comprise "fringe" benefits and collectively cost the industry well over three quarters of a billion dollars.**

Part I of *Steelways'* series on the nature and extent of this oft-misunderstood expense covered the "premium pay" portion of the overall benefits burden.

Part II, presented here, covers pay for vacations and holidays. These provisions cost the industry $ 210 million in 1960 and added nearly 25 cents to the costs for each hour Marty and his fellows worked throughout the year.

holiday but fails to report (and his failure to report is without stipulated cause).

It's interesting to note that actually about half the steel industry labor force works on each holiday. When a wage earner does work the holiday, he receives the pay he actually earns that day *plus* 1¼ times his regular earnings minus premiums. This sizable premium was covered in Part I of this series.

Marty, or any other hourly steel employee, can readily calculate the duration and pay due him for his vacation under the following industry table:

Years of Service	*Vacation Time Off*	*Amount of Vacation Pay*
1 but less than 3	1 week	1 week's pay
3 but less than 5	1 week	1½ weeks' pay
5 but less than 10	2 weeks	2 weeks' pay
10 but less than 15	2 weeks	2½ weeks' pay
15 but less than 25	3 weeks	3 weeks' pay
25 or more	3 weeks	3½ weeks' pay

Marty also knows that so far as practicable in insuring orderly operations of his plant, he will be granted his choice of vacation period so long as it is taken during the vacation season for his company.

And he knows his vacation pay will be based upon his earnings for a base period prior to that vacation.

These and other conditions of their employment perhaps contribute to the fact that 63 percent of the industry's hourly rated workers have an average length of service in the industry of 10 years or more.

All of which boils down to this: Marty's vacation pay provisions are sufficient to add 19½ cents to his average pay for every hour worked throughout the year. What Marty spent on vacation may have given him private pause, as it does most of us; what the industry spent to put Marty and all other eligible steel employees on their vacations with pay in 1960 is a cost item of public record and profound dimension—$164 million.

*This series deals with fringe benefits for hourly employees in steel production only. It does not include the cost of such benefits for nonsteel producing employees or the growing proportion of salaried employees.

Pay for holidays not worked

5.4¢ PER HOUR

$46 million

Vacation Pay

19.5¢ PER HOUR

$164 million

TOTAL VACATION AND HOLIDAY PAY COST $210,000,000

Shaking the Salt From the

EDITOR'S NOTE—*Since preparation of this feature, the Freeport, Texas, desalinization plant described herein suffered the full fury of Hurricane Carla. But winds locally clocked at 150 miles per hour and six feet of flood waters did no substantial damage to the basic steel portions of the facility. Only nine days after the September 10-11 "storm of the century" the damage, largely electrical, had been repaired and the plant resumed operations.*

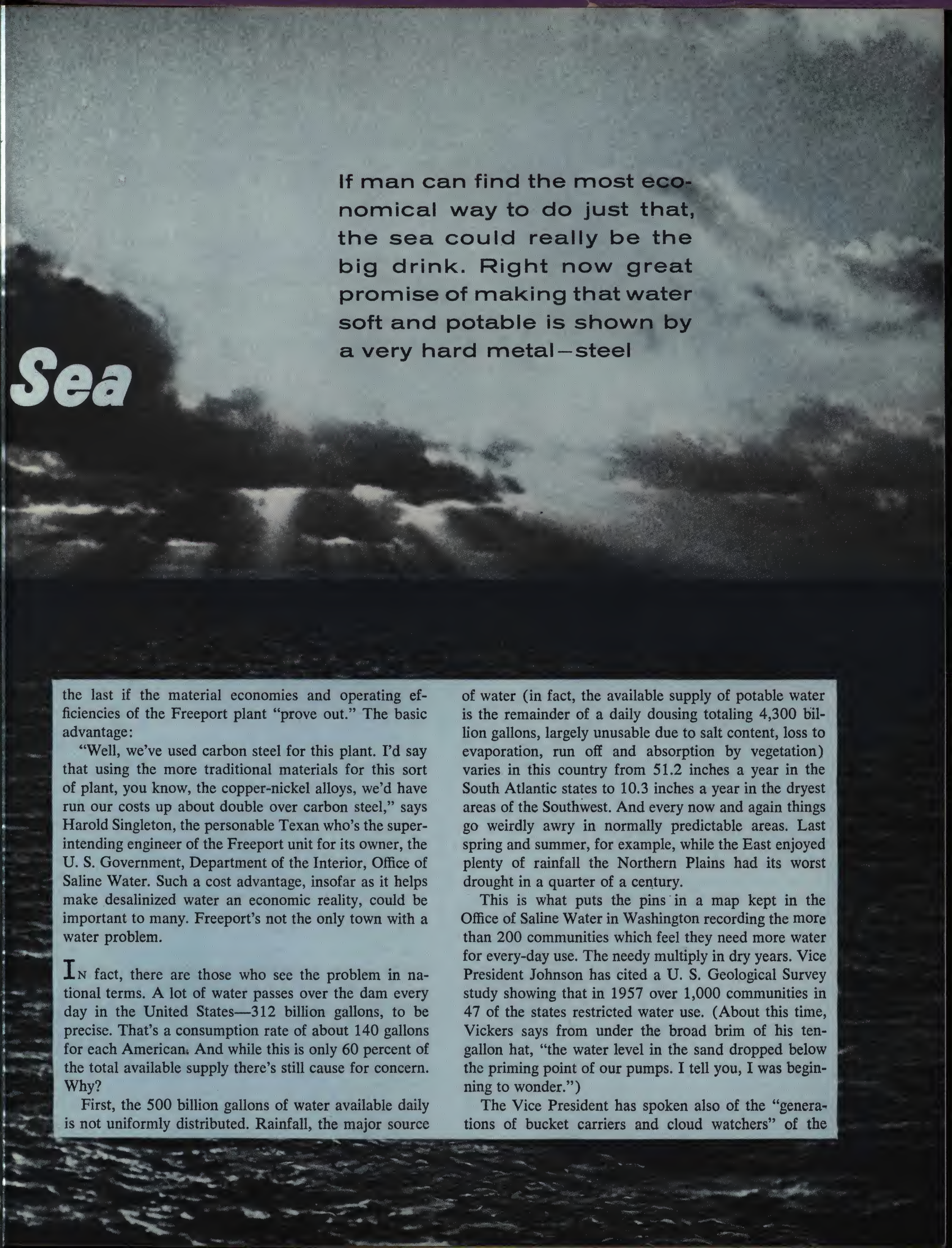
THE roads run out straight—so straight and flat under a hammering sun that there seems always to be a puddle shimmering on the horizon. But that's just an old trick played on the eye.

Citadels of cumulus clouds ring the horizon, and their occasional stately processions in from the nearby Gulf of Mexico bless this southeastern area of Texas with 48 inches of rain a year. The rain makes the grass lush and that makes the cattle fat, but not much of the rain runs into man's drinking cup. It runs instead off the low lying land (6 feet above sea level) into the Gulf.

Surrounded by the wetness in sea and sky, man must nevertheless dig for his potable water. As T. C. Vickers, city water superintendent for Freeport, Texas, says: "What you see right around here hasn't anything much to do with our water table. That's determined by the rainfall in the rolling hills just north of Houston (itself about 60 miles north of Freeport). That water drains down into the Hockey Sand strata where we tap it out with seven wells down about 250 feet. Geologists and so forth have reckoned it takes the water about four to five years to reach us here and sometimes in periods of drought the water in the sands gets down mighty low. Anyway, there's small margin for industrial growth. Industrial growth is what we want. To get it we need to be able to offer industry the water it needs."

Freeport's problem is not unique. But its promising solution is. For Freeport now gets an added million gallons of potable water a day—from the sea. And between each gallon of the water in the sea and its use at the faucet, there's a pound of steel. Put together, those pounds of steel can be found standing behind a fence bearing the legend: "Salt Water Conversion Demonstration Plant." The plant is the first sea water conversion unit to help supply regularly the water needs of a U. S. municipality.

It's also the first desalinization unit to be constructed largely of inexpensive carbon steel. But it may not be



Sea

If man can find the most economical way to do just that, the sea could really be the big drink. Right now great promise of making that water soft and potable is shown by a very hard metal—steel

the last if the material economies and operating efficiencies of the Freeport plant "prove out." The basic advantage:

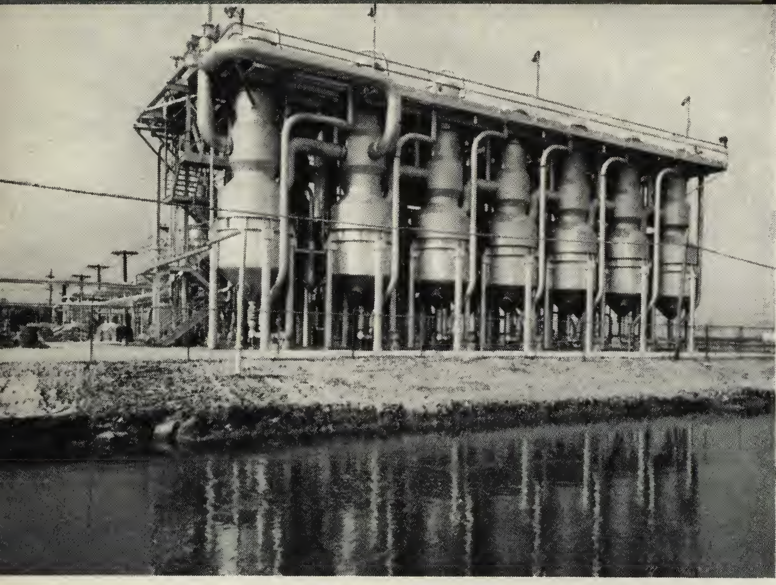
"Well, we've used carbon steel for this plant. I'd say that using the more traditional materials for this sort of plant, you know, the copper-nickel alloys, we'd have run our costs up about double over carbon steel," says Harold Singleton, the personable Texan who's the superintending engineer of the Freeport unit for its owner, the U. S. Government, Department of the Interior, Office of Saline Water. Such a cost advantage, insofar as it helps make desalinized water an economic reality, could be important to many. Freeport's not the only town with a water problem.

In fact, there are those who see the problem in national terms. A lot of water passes over the dam every day in the United States—312 billion gallons, to be precise. That's a consumption rate of about 140 gallons for each American. And while this is only 60 percent of the total available supply there's still cause for concern. Why?

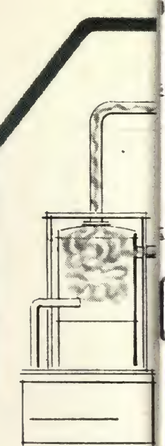
First, the 500 billion gallons of water available daily is not uniformly distributed. Rainfall, the major source of water (in fact, the available supply of potable water is the remainder of a daily dousing totaling 4,300 billion gallons, largely unusable due to salt content, loss to evaporation, run off and absorption by vegetation) varies in this country from 51.2 inches a year in the South Atlantic states to 10.3 inches a year in the dryest areas of the Southwest. And every now and again things go weirdly awry in normally predictable areas. Last spring and summer, for example, while the East enjoyed plenty of rainfall the Northern Plains had its worst drought in a quarter of a century.

This is what puts the pins in a map kept in the Office of Saline Water in Washington recording the more than 200 communities which feel they need more water for every-day use. The needy multiply in dry years. Vice President Johnson has cited a U. S. Geological Survey study showing that in 1957 over 1,000 communities in 47 of the states restricted water use. (About this time, Vickers says from under the broad brim of his ten-gallon hat, "the water level in the sand dropped below the priming point of our pumps. I tell you, I was beginning to wonder.")

The Vice President has spoken also of the "generations of bucket carriers and cloud watchers" of the



The Freeport plant (left) utilizes a tongue twisting process: Multiple-Effect Long-Tube-Vertical Distillation. Briefly, a series of 12 evaporators, each containing hundreds of tubes, uses the same heat over and over to purify salt water. Brine from the sea enters the tubes of the first evaporator (right) where it is heated and partially vaporized by steam from an outside source. The steam and vapor thereby produced from the brine in the first evaporator is used to heat the remaining brine again in the second evaporator. Having given up its heat to the brine, this steam and vapor then distills as pure water. The brine it heated in the second evaporator then passes on its heat and vapor to the third evaporator, where it distills into water, and so on through the series.



American West who cannot take water for granted as do the cities' millions of "faucet turners." But this may be an exaggeration: the residents of one of his own state's largest cities, Dallas, had to line up to buy water at 50 cents a gallon (twice the then local price of gasoline) in 1957. And New Jersey has laws for dry periods that could land the owner of a leaky faucet in jail for as much as 30 days.

To this uneven distribution of water must be added an inexorably rising consumption trend. Today's use of water contrasts with but 40 billion gallons daily in 1900 and an estimated consumption in 1975 of 453 billion gallons daily. That's getting uncomfortably close (about 90 percent) to total available supplies.

Growing food for the growing population (estimated at 235 million in 1975) has spurred that trend. For instance, raising the grain in one slice of bread takes around 37 gallons of water. Little wonder agriculture absorbs about 50 percent of our water supply.

Another 40 percent goes to industry. Here about 660,000 gallons of water are used to produce one ton of newsprint, about 60,000 gallons for a ton of steel, and the mining, chemical, plastics and pharmaceutical industries all are even heavier consumers. In Freeport the Dow Chemical Company uses water at a prodigious rate, has built its own reservoirs to reduce its drain on the town's well supplies and takes 500,000 gallons of the saline water plant's output every day. Dow is, therefore, an avid supporter of the desalinization plant.

"That's in part why we located here," Singleton explains. "Here was a receptive community and a helpful industry both of which wanted the converted water. That's plenty important with anything this new and vulnerable." Industry generally may be expected to support desalinization efforts since its trend of water use is the fastest growing—with no sign of a letup.

The remaining 10 percent of present water consumption takes place at home. About 20 to 30 gallons of water go down the drain with every load of wash, not to speak of washing dishes and the car, sprinkling the ironing and the lawn, filling the bathtub, the swimming pool or maybe just the birdbath.

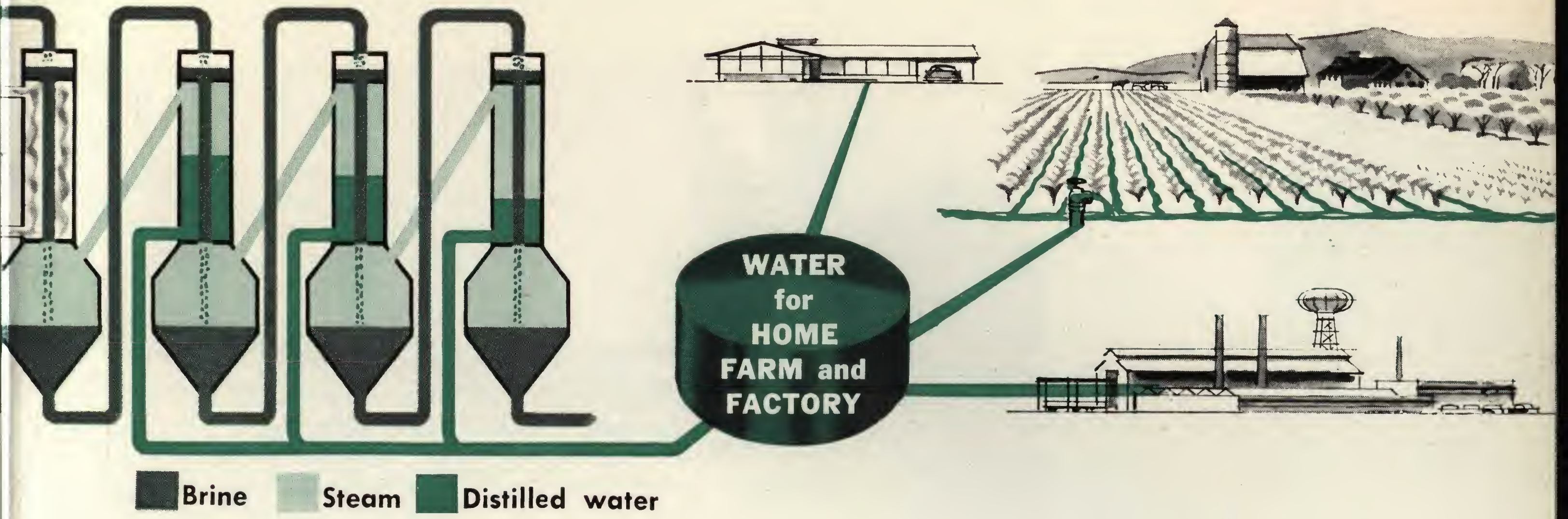
The potential problem in the United States is as nothing compared to actual problems abroad.

Millions of the world's peoples spend as much as one third of each day hauling water, are forced to live near rivers and springs and are on diets dictated by a want of water that curtails their agriculture. One third of the earth lies in arid zones and more than 60 countries have arid and semi-arid areas. This is what the Research and Education Committee for a Free World undoubtedly had in mind when it reported "the United States . . . would gain the gratitude of millions in the uncommitted and newly developing countries" if it succeeded in devising an economic way to alleviate water shortages through desalinization.

The sea is an attractive source for potable water, because though more contaminated (35,000 parts salt per million parts water) than brackish water caught in underground pools (1,000 parts mineral per million parts water) it is far more accessible. Freeport, for example, could get more water from deeper wells "but we'd have to drill down to about 1,100 feet and then what we'd get would be as brackish as all get out," Vick reports. It would, therefore, need processing in any case.

On the other hand an estimated 320 million cubic miles of saline water cover three fifths of the earth's surface and this water is as easy for many to tap as the Gulf is for Freeport. In fact, in the U. S. half the states with 65 percent of our industry and 55 percent of our population border on an ocean.

This then is the problem and the promise in which



the Office of Saline Water has been submerged since the office's inception in 1952. Freeport and the four other scheduled Government desalinization plants, utilizing various processes developed through the years, have brought the OSW's work to the stage where the in-use costs of these processes can now be studied.

And that's the rub. In this country, at least, it's unlikely distilled sea water will ever play a large agricultural role. Even were costs driven down to 25 cents per thousand gallons, the minimum possible according to some authorities and well below Freeport's actual or possible levels, farmers would have to pay $80 an acre foot for irrigation (325,000 gallons cover one acre with one foot of water) against a current high of around $5. But that is not to say such water won't perhaps ease a city's problems (most municipal water costs 30 to 40 cents per thousand gallons) or the needs of industry in certain regions.

Singleton feels the way to reduce desalinized water costs is to reduce plant material costs and boost operating efficiencies. "It was our use of inexpensive ferrous material—carbon steel—that alone accounts for our keeping its initial cost down to around $1,250,000."

THIS is the real significance of Freeport. Here an attempt is being made to ascertain whether chemical treatment of the sea water being processed will keep corrosion levels of mild steel low and uniform enough to avert "the local, crippling sort of corrosion that will cause some of our piping to leak." If this can be done, Singleton says, "well, we can enjoy all the economies of carbon steel, including the fabricating economies because, you know, welding carbon steel is a lot cheaper than joining some of the more specialized alloys, and just increase all our pipe and plate sizes to overcome general corrosion and get longer life." Singleton sums up: "Look, it's just as simple as this: either the maintenance costs will be prohibitive or they won't be."

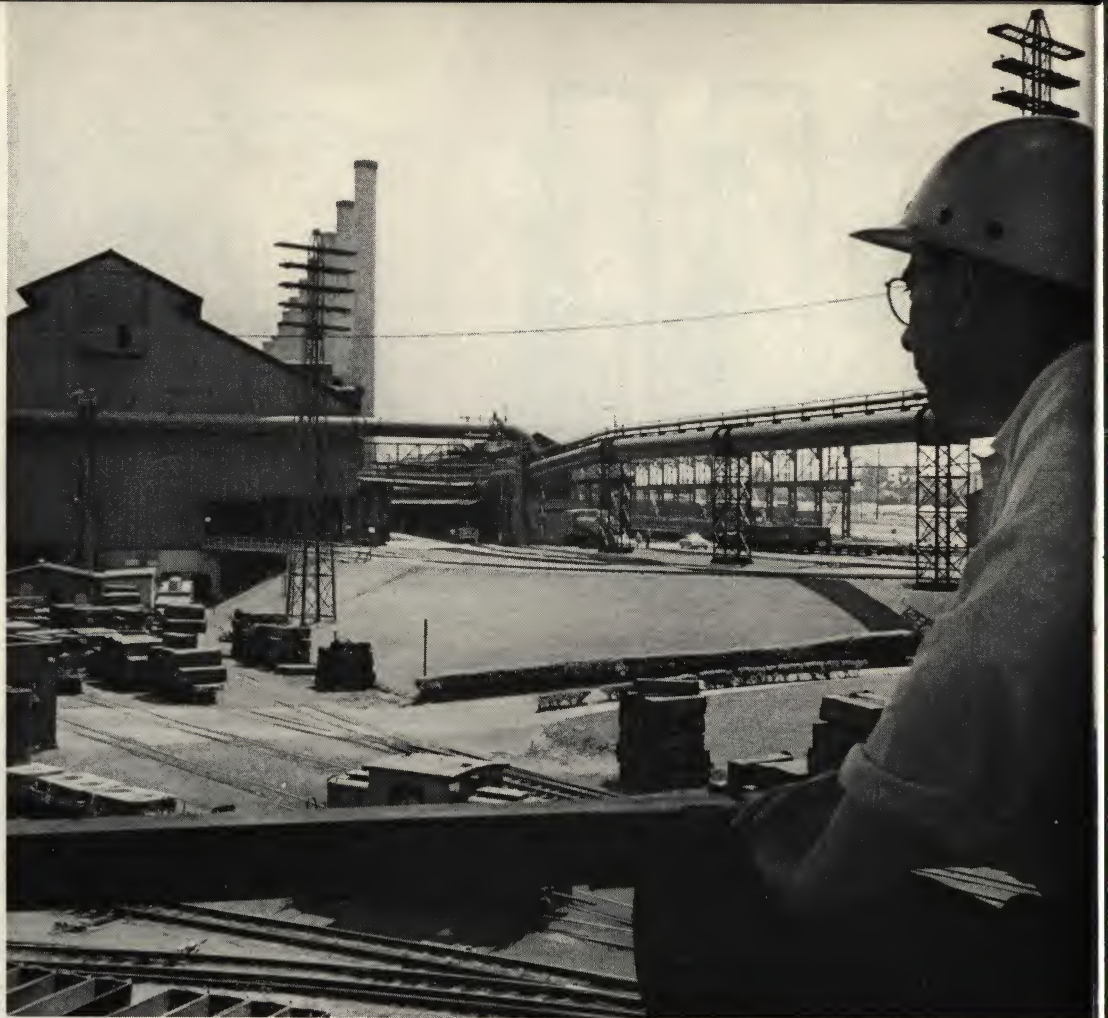
So far he is, as the business men say, cautiously optimistic. The plant's costs are running around $1.00 to $1.25 per thousand gallons—just about where targeted. And Singleton feels positive this could be driven down markedly "if we just scaled the operation up to about 20 million gallons a day. That would not notably increase our operating manpower but we'd get much better efficiency out of the increased plant."

At that the water would range high in current competitive costs. But to gain the experience necessary for determining just how far prices can be driven down, the Freeport plant exists and sells its water at 20 cents a thousand gallons to the town and 30 cents a thousand gallons to the Dow plant.

That is to say, it sells the water at a sizable loss. But one hurdle, at least, has been leaped: "that water looks darn good and clear," Vick states. "Heck, the town drank it for two weeks when we checked it out thoroughly, then piped it into our mains without saying anything for two weeks before the official opening last June. Folks sure were surprised to learn they'd been drinking it all along."

VICKERS whips out chemical reports from his own and Public Health laboratories that show the desalinized water is 50 parts mineral per million parts water against a count of about 1,200 parts mineral per million parts water on the well supplies. "Softer, you see, so most of my phone calls are requests from folks who want some of the water out their way."

In the meantime the Freeport plant's goal was never to be profitable but rather to measure the possibilities of desalinization's ever being economical. Its results thus far are as good as any on the record. They got that way with steel. There's every reason to believe they might get a lot farther the same way.



Tom Snyder takes a moment on way to his job as inspector in the press forging and heat treating mill to look out on a section of the plant area where, as the saying goes, there is a place for everything and everything is in its place

Their stakes in the SWEEP

For more than 50 years thousands of employees have taken a personal interest in keeping things clean. The steel mill's bright surface reflects their success in the daily campaign. They help themselves by holding safety up and lost motion down

VISITORS from all over the world sign in for passes, hard hats and safety goggles at the plant gate. They come to observe technological advances, modern equipment, training techniques, safety observances and the latest steelmaking practices. Many of these sights will be long remembered, but the longest is more likely to be the mill's dress parade orderliness.

Even when in the mill to report on this tidiness, you wonder whether your eyes are playing tricks. Imagine, then, trying to tell someone what it's like; someone like the English portrait painter, for instance, who was a guest at the home of the president. The latter finally gave up trying and insisted on driving his friend down to see for himself.

The man who is now the general manager recently recalled his concern when he saw the distinguished visitors at the gate those many years ago.

"I knew everything was supposed to be tidy, but would it be?" he asked again in retrospect. "You have no idea of the lengths our president went to impress his English friend. He took him to the open hearth pits, of

all places. I thought: what have I done to deserve this?"

Open hearth pits are, as the Englishman might have expressed it, deucedly hard to keep clean. Anyone who has seen them knows the floor is sometimes uneven, that it's hard to keep refractory brick from chipping off and lying about and that you can't prevent a few pieces of slag from tumbling off cars carrying the stuff away.

Furthermore, when a furnace has been tapped and the molten metal is flowing into the ladle, showers of sparks pelt the raised platform along the opposite wall. The sparks are actually tiny blobs of liquid steel that quickly harden into miniature pellets, often as round and smooth as ball bearings. If left there, after the tapping, they make footing slippery.

But as the notables walked through the area, pausing here and there, the floor was as clean and firm as the Yankee Stadium infield before a World's Series game. There were marks on the level surface that showed it had been freshly swept, as it should have been. As the pair left, the painter freely admitted he had been treated to "an extr'ordin'ry good show."

The good show has been performed three times daily, with some schedule variations, of course, for 50 years or more. The first "producer" of the show—he was head of the company then—left these thoughts on paper:

"In all my experiences with mill management I can truthfully and decidedly say I never saw a disorderly mill that was either financially or technically sound . . . I can never be convinced that a dirty, disorderly works . . . will turn out the highest or best class of work—and no works that does not aim for and turn out the best character of work can be permanently successful."

Al Haller signals the craneman as flasks (molds) are moved about in foundry yard where the only space left is up

Charles Mitchell makes a clean sweep of things as he powers his way through one of the mill's furnace areas

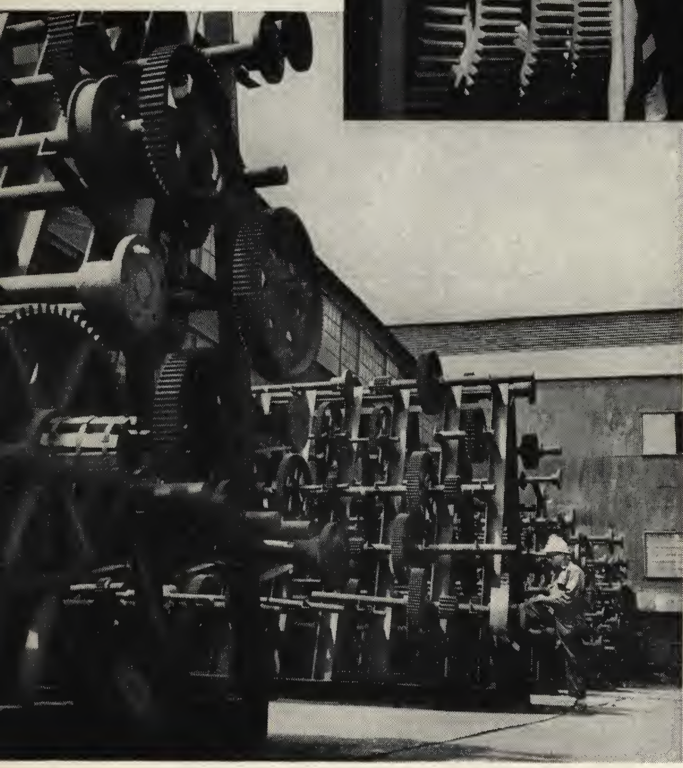
The man who was to succeed him and guide the English painter on the aforementioned show-me tour stressed another facet of good housekeeping.

"We are primarily engaged in making steel," he declared in an article published in 1913, "but we make better steel and more of it by also raising flowers and having them in our yards." The formula must have long since proved itself for flowers, grass plots and shade trees still lend color and charm to the industrial scene.

Those who set up good housekeeping in mill or factory keep in mind the four major conditions to be met:

- *First, the head man must want it that way.*
- *Second, he and his staff must impress the men by what they do.*

The general manager explained: "Our employees can see it is costing money to keep things shipshape. The men figure—and rightly—that if the company is spending a lot of dollars for them, it is genuinely interested in



Fred Rauscher examines an identification tag on a neatly appointed spur gear rack (at right) and takes inventory (below) at the frame rack for line shafting in the rolling mill's spare parts yard

them. And so they take more pride in their shop and in their work."

He looked across the tree-lined walk toward the mill and then added: "We firmly believe that safe working conditions and good housekeeping go hand in hand."

- *Third, he and his staff must impress the men by what they say. This is where good humor helps. Men who've come up from the steel mill floor will tell you that work spiced by fun goes down a lot better with everyone.*

One man, who grew up in this company and is now an operations vice president in another firm 2,500 miles away, is well qualified to speak on this.

From the time he arrived at the western mill, he started planting the same principles on which he had been raised. He would roam through the plant, kidding people about the "mess" their area was in and betting, never more than a dime, that the fellows couldn't restore order in a month of Sundays. He was good naturedly joshing them into being neat.

- *Fourth, there must be dedicated men who as part of their work insist on keeping up appearances.*

Walking through the miles-long steel plant you wondered how the housekeeping could be any better. Men worked with a precision born of physical comfort and mental skill. But safety men are hard to satisfy. We came out of the building and stood for a moment in the roadway that must have just been scrubbed. Suddenly, the wind whipped a chewing gum wrapper past us.

"I wish I'd seen who threw that," my safety engineer escort said as he stooped to pick it up. "Whoever did it knows better."

Then there was the stop we made in the spare parts yard outside the rolling mills. The engineer turned to a foreman: "George, how long has that boiler ash been there?" His finger sought out black dust that had accumulated in little piles.

"They'll be cleaning it up any minute now," George replied. "I don't understand it. They're going over the boilers inch by inch to see what's causing it."

Like advertisements, textbooks and a vitamin a day, one never knows how much each contributes to his behavior or health, and therefore cannot specifically measure its value. Similarly, companies cannot put a price tag on even so valuable a pursuit as good housekeeping.

"This isn't a statistical formula you prove out by numbers," the company's top safety man added. "If you want numbers, though, we do know that year after year our people adhere more actively to good housekeeping practices. Since these are the cornerstone of safety, our emphasis on them also increases employees' observance of safe work practices."

ONE day several visitors were being taken through the mill. It was lunch time and as they neared the open hearth area they saw several furnace men eating with their backs against the outer wall of the building. A guest happened to notice that after a worker finished his sandwich, he crumpled the wax paper into a ball, stuffed it inside the paper bag on his lap, carried the bag about 40 feet to a large yellow receptacle, once a discarded oil drum, and threw it in.

The man blinked in wonderment. Then he walked over and said, "Excuse me, but why did you do that?"

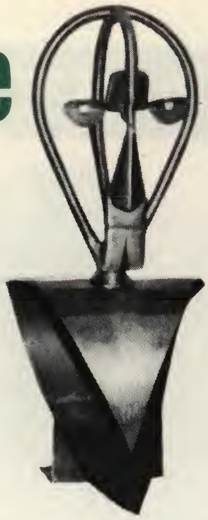
The worker was taken a little aback. "Why did I do what?"

"Why did you carry that paper over there and get rid of it?"

The worker looked puzzled.

"Why?" he repeated. "It's something I've always done here. You wouldn't expect me to throw it on the floor, now, would you?"

On the steel beam since boyhood



We came upon a story the other day about a young man in a small Pennsylvania city, and it started us thinking. It was told by Ross A. Hufford, a star end for Penn State in the early Twenties and now a high school English teacher in Lewistown, Penna.

THE young man's name is Bill Benner. For years he had kept his talent hidden in the basement workshop of his home.

When he wasn't in school or delivering papers or practicing with the team, Bill would shut himself away and shape steel into imaginative designs.

From the time he could reach them, the boy had puttered about the drills, lathes and saws belonging to his Dad, John T. Benner, a welder in a steel mill at nearby Burnham. Bill felt most at home there.

When he went to Lewistown High School he got to wondering what he could make that would be distinctive. An art teacher he had had earlier, Mrs. Reba Esh, had encouraged him to try his hand at bending steel to his will and plan.

Bill developed the habit of carrying a sheet of paper in his pocket. When an idea occurred to him, he would start sketching a pattern. Perhaps weeks afterward he would make some improvements on it. Finally, maybe a year afterward, he would start work.

You could say of the time Bill spent in producing an object, nine tenths was planning.

Every design had to be hand wrought. From steel sheet, pipe and scrap the youth would cut each section by hand, file, bend, weld, bore and shape.

No one knew about it, because he kept his creations locked up. He feared they weren't any good. But they were never far below the surface of his thinking and always threatening to boil over.

The day came when Hufford assigned a composition to his class on a subject of the students' own choosing. Benner decided to describe two of his works; Four Winds and Explorer 12, by name.

Reading the essay, Hufford was amazed. "You have these—you've made these?" he asked.

Ross A. Hufford and Bill Benner

"Yes sir," was the answer. "They're just two. Right now I'm working on Homo Mettalum."

Hufford persuaded the 18-year-old to bring in his art. When he saw the creations, the English instructor was so impressed that he placed them on display in the school's trophy cabinet.

Now Bill has his heart set on finishing his machine shop course at high school and heading toward a career as a mechanical technician. This would afford him the chance to use his talent in creating new machines and devices.

You ask: what's unusual about this, except maybe the hobby itself? Nothing, likely. Just a young fellow building self-reliance by delivering papers, learning sportsmanship on the athletic field, enjoying home ties, making friends in the community, using his leisure time to increase his talents.

Granted the cultivation of such qualities does not generally make headlines, we still express the hope this will never discourage the Bill Benners of the world from continuing the good work.

It's What's up

A MAN presses a portable switch. An oil crew guides a drilling rig into position. Engineers direct skyscraper construction astride steel girders. A workman cuts into the street looking for a leaky gas line. An architect checks his prints against the newly laid ground floor. A logger precedes a truck into the forest. A river worker brings down pipe from a helicopter.

These are scenes from recent advertisements in national magazines. Despite the diverse occupations pictured, all of the men have something in common: they are wearing hard hats.

This is good news to the industry that has put more hard hats on heads than any other in America: iron and steel. For years workers in the iron and coal mines, limestone quarries and the steel mills have worn them as a matter of course. Guests and visitors do likewise. On any working day there will be hundreds of thousands dotting the steelmaking scene.

In the paid space of America's popular journals the number and variety of scenes featuring the hard hat (sometimes more formally called a safety helmet) is steadily increasing. It was likely first worn in ads by workers in iron, coal and steel but now, in the words of the durable Durante: "everybody wants to get into the act." And everybody has—even to the political administration of one state that proudly displays the hat as a reflection of industrial growth.

Inquiries directed to some of the agencies creating such ads leads to this conclusion: the hard hat is becoming the symbol of the man who is getting things done.

"WE WERE enamored with the hard hat or safety helmet," explained Margaret Hockaday, head of her own ad firm in New York, "because we considered it the symbol of the occupation. Our young man, Philip, is an architect." Sponsor of the ad in which Philip appeared was the Wool Bureau, Inc.

Halsey Davidson, vice president of the Campbell-Ewald Company in Detroit, pointed out "that it is both a matter of policy and common practice for workers in the field to make use of safety helmets." In the ad to which he referred, Chevrolet was the sponsor and the "field" was populated by public utility workers.

"In visiting areas for case history material," said Lowell S. Monroe, a vice president with Griswold-Eshleman Company in Cleveland, "we have had to conform to safety regulations so long that wearing a hard hat and safety glasses is second nature with us.

"Quite often, in traveling with a client's field salesmen or servicemen, I find that they have hard hats in

TOP that Counts

their cars, just as they carry coveralls and high boots."

The presence of hard hats in cars had also caught the attention of a Canadian writer, John Gossip. In an article published in *The Elizabethan* he good-humoredly contended that the hard hat belonged not to the architect or the roughneck or the steelman. Gossip staked out still another claim.

"Not a single Canadian engineer—consulting, mechanical, electrical, civil or sanitary—fails to proclaim his profession to the world," Gossip wrote. "He merely leaves his safety helmet lying artfully on the rear window ledge of his automobile . . .

"All of which, it goes without saying, is intended to proclaim to the world, 'I may be living in a split-level ranch-type bungalow in Suburbia, but my hat and I saw service at Resolute Bay.' "

(For the information of all land-locked Americans, Resolute Bay is situated in the Arctic, far north of Hudson Bay. It is a small settlement containing a weather outpost and a Royal Canadian Naval station.)

In the steel industry early in the century few but safety men would be caught wearing a hard hat. Steelworkers gave various reasons for shunning it: The hard hat was for sissies, it looked funny, it was hot or heavy, it was unnecessary.

And having delivered themselves of a vigorous No, they would jam their derbies down over their ears and stalk back to work.

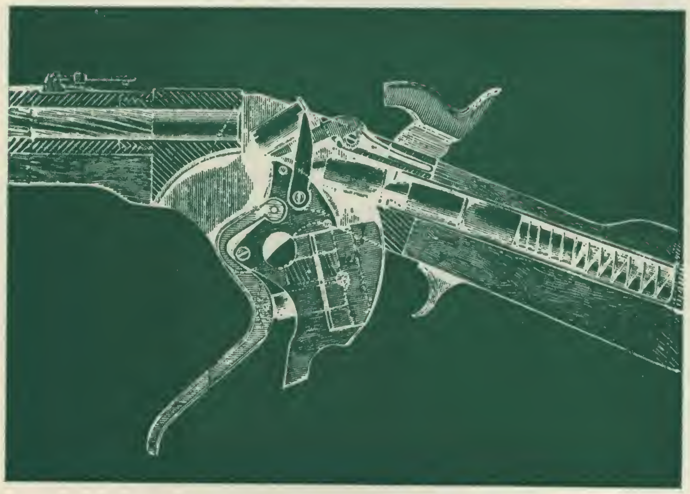
But sometime somewhere an unfortunate worker stopped a flying object with his head, proving to himself and those around him that he wasn't really cut out for such a headstrong role. Little by little the companies' safety messages combined with experience persuaded steelmen to take to cover.

The first hard hats were made of steel. Since that time many materials have been tried, as the designers sought an ideal combination of strength, lightness and resistance to water, acid and fire. Helmet makers are generally agreed today that plastic—light and electrically nonconductive—is best for many industrial uses.

As many as 15 different colors in headgear may be seen in a steel mill, each hue distinguishing the department or occupation of the wearer. The helmet's surface is almost certain to bear the name of its owner. It may carry further identification, especially if the wearer is a member of a rescue squad or has won a special award.

Whether it is now the symbol of occupation or of status, one thing is still paramount: the hat fits anyone with a head for safety.

Mr. Lincoln and the Shooting Match



The tall man in the black alpaca coat and stovepipe hat gravely hefted the rifle on which so much might depend . . . He had examined the firearm carefully the day before when its inventor, Christopher Spencer, had brought it to the White House. The few familiar with it in the Lightning Brigade and the Navy attested to its superior firepower, but Army Ordnance still remained unconvinced. "Let me see the inwardness of the thing," the President had said. Spencer took his seven shooter apart, using only a screwdriver. "Good," was the reaction. "Tomorrow afternoon we will go out and see the thing shoot.". . . With a Naval aide looking on, Lincoln now sighted upon the target—a smudge on a smooth pine board nailed to a tree 40 yards away. Seven times the board shivered and the birds darted nervously about the glade bordering the Potomac. Then Spencer took aim, and his seven shots moved his famous host to say, "You are much younger than I am, have a better eye and steadier nerve.". . . It was August 18, 1863. Turning to his diary Lincoln's assistant, John Hay, called the new breech loading rifle "a wonderful gun, loading with absolutely contemptible simplicity and ease, with 7 balls and firing the whole readily and deliberately in less than half a minute." Shortly thereafter large numbers were produced and speedily dispatched to Union forces. Probably more than any other small arm, it proved a decisive factor in the winning of the war.

Footnotes to History

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